

What is claimed is:

1. A non-aqueous electrolyte secondary battery provided with a positive electrode, a negative electrode using carbon material as negative electrode active material, and a non-aqueous electrolyte solution, wherein

said non-aqueous electrolyte solution contains at least a saturated cyclic carbonic ester and a cyclic carbonic ester having C=C double bond where an amount of the cyclic carbonic ester having C=C double bond is in a range of  $1.0 \times 10^{-8}$  to  $13.0 \times 10^{-5}$  g per negative electrode capacity of 1 mAh.

2. The non-aqueous electrolyte secondary battery according to claim 1, wherein

said carbon material as the negative electrode active material is graphite-containing carbon material.

3. The non-aqueous electrolyte secondary battery according to claim 2, wherein

said graphite-containing carbon material has spacing of (002) Plane,  $d_{002}$ , in the range of 0.335 to 0.338 nm and crystallite whose size along c-axis length ( $L_c$ ) is not less than 30 nm as measured by X-ray diffraction analysis.

4. The non-aqueous electrolyte secondary battery according to claim 2, wherein

said the graphite-containing carbon material has a ratio ( $I_{110}/I_{002}$ ) of a peak intensity  $I_{110}$  of (110) Plane based on the peak intensity  $I_{002}$  of the (002) Plane in the range of  $5 \times 10^{-3}$

to  $15 \times 10^{-3}$  as measured by X-ray diffraction analysis.

5. The non-aqueous electrolyte secondary battery according to claim 2, wherein

said graphite-containing carbon material has an R value ( $I_D/I_G$ ) as measured by Raman spectroscopy in the range of 0.15 to 0.7.

6. The non-aqueous electrolyte secondary battery according to claim 1, wherein

the amount of the negative electrode active material in said negative electrode is in the range of 1.0 to 12 mg/cm<sup>2</sup>.

7. The non-aqueous electrolyte secondary battery according to claim 1, wherein

the cyclic carbonic ester having C=C double bond in said non-aqueous electrolyte solution is at least one of vinylene carbonate, 4,5-dimethyl vinylene carbonate, 4,5-diethyl vinylene carbonate, 4,5-dipropyl vinylene carbonate, 4-ethyl-5-methyl vinylene carbonate, 4-ethyl-5-propyl vinylene carbonate, 4-methyl-5-propyl vinylene carbonate, and vinyl ethylene carbonate.

8. The non-aqueous electrolyte secondary battery according to claim 7, wherein

the cyclic carbonic ester having C=C double bond in said non-aqueous electrolyte solution is vinylene carbonate.

9. The non-aqueous electrolyte secondary battery according to claim 1, wherein

the saturated cyclic carbonic ester in said non-aqueous electrolyte solution is at least one of ethylene carbonate, propylene carbonate, and butylene carbonate.

10. The non-aqueous electrolyte secondary battery according to claim 1, wherein

said non-aqueous electrolyte solution contains chain carbonic ester.

11. The non-aqueous electrolyte secondary battery according to claim 10, wherein

said chain carbonic ester is at least one of dimethyl carbonate, ethyl methyl carbonate, diethyl carbonate, methyl propyl carbonate, ethyl propyl carbonate, and methyl isopropyl carbonate.

12. The non-aqueous electrolyte secondary battery according to claim 1, wherein

positive electrode active material in said positive electrode contains lithium-manganese-containing composite oxide having a spinel structure and lithium-nickel-cobalt-manganese composite oxide.

13. The non-aqueous electrolyte secondary battery according to claim 12, wherein

said lithium-manganese-containing composite oxide having the spinel structure is represented by a general formula  $\text{Li}_x\text{Mn}_{2-y_1}\text{Ml}_{y_2}\text{O}_{4+z}$  (wherein Ml denotes at least one element selected from a group consisting of Al, Co, Ni, Mg, and Fe, and

relationships  $0 \leq x \leq 1.5$ ,  $0 \leq y_1 \leq 1.0$ ,  $0 \leq y_2 \leq 0.5$ , and  $-0.2 \leq z \leq 0.2$  are satisfied), and said lithium-nickel-cobalt-manganese composite oxide is represented by the general formula  $\text{Li}_a\text{Ni}_b\text{Co}_c\text{Mn}_d\text{O}_2$  (wherein the relationships  $0 \leq a \leq 1.2$  and  $b+c+d=1$  are satisfied).

14. The non-aqueous electrolyte secondary battery according to claim 12, wherein

the positive electrode active material contains the lithium-manganese-containing composite oxide having the spinel structure and the lithium-nickel-cobalt-manganese composite oxide in a weight ratio of 20 : 80 to 80:20.